PATENT COOPERATION TREATY

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# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference<br>K 50 577/1 mz | **FOR FURTHER ACTION** | See Form PCT/IPEA/416 |
|---|---|---|
| International application No.<br>PCT/EP2004/011979 | International filing date *(day/month/year)*<br>22.10.2004 | Priority date *(day/month/year)*<br>24.10.2003 |

International Patent Classification (IPC) or national classification and IPC
H01B3/44

Applicant
BOREALIS TECHNOLOGY OY et al.

1. This report is the International preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 2 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

| | | |
|---|---|---|
| ☒ | Box No. I | Basis of the opinion |
| ☐ | Box No. II | Priority |
| ☐ | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| ☐ | Box No. IV | Lack of unity of invention |
| ☒ | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| ☐ | Box No. VI | Certain documents cited |
| ☐ | Box No. VII | Certain defects in the international application |
| ☐ | Box No. VIII | Certain observations on the international application |

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 19.05.2005 | 23.12.2005 |
| Name and mailing address of the International preliminary examining authority:<br>European Patent Office - P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk - Pays Bas<br>Tel. +31 70 340 - 2040 Tx: 31 651 epo nl<br>Fax: +31 70 340 - 3016 | Authorized Officer<br>Stinchcombe, J<br>Telephone No. +31 70 340-3679 |

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.
PCT/EP2004/011979

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

| | |
|---|---|
| **Description, Pages** | |
| 1-16 | as originally filed |
| **Claims, Numbers** | |
| 1-10 | received on 18.11.2005 with letter of 18.11.2005 |
| **Drawings, Sheets** | |
| 1/2, 2/2 | as originally filed |

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | |
|---|---|---|
| Novelty (N) | Yes: Claims | 1-10 |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | 1-10 |
| | No: Claims | |
| Industrial applicability (IA) | Yes: Claims | 1-10 |
| | No: Claims | |

2. Citations and explanations (Rule 70.7):

**see separate sheet**

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**Closest prior art**

US 5 225 469 (D1): polymeric composition for insulating a low voltage conductor (see D1 col 11 lines 1-17) which comprises a copolymer of ethylene and a polar monomer (see D1 col 3 lines 38-42). D1 discloses the addition of alkoxysilanes, e.g. VTMS, to the composition as additives (i.e. not part of the polymer; see D1 col 5 lines 16-59 and examples) as well as extrusion of this composition (see D1 col 13 lines 14-54).

**Novelty** (independent claims 1, 8, 10)

Difference: the composition of the insulation layer application includes hydrolysable silane groups in the polyolefin chain which is absent in D1.

**Inventive step**

The effect of the hydrolysable silane groups is to cause cross-linking of the polyolefin, which leads to an insulation layer having improved physical properties with respect to prior art layers, e.g. better elongation at break and tensile strength at break values, while having good adhesion to polyurethane polymers and resistance to deterioration by PVC polymers. There is no indication in the prior art to carry out such cross-linking using the technique described, in order to improve the properties of an insulation layer for a low voltage conductor. Therefore the solution to the problem corresponding to the above effect is considered non-obvious.

The corresponding process claim 8 and use claim 10, which both contain the features that a composition for a low voltage power application comprises a polyolefin comprising 0.02-4% of a polar group compound and incorporating a compound with hydrolysable silane groups, are novel and inventive by analogy with the above.

## CLAIMS

1. A low voltage power cable comprising an insulation layer with a density below 1100 kg/m$^3$ which comprises a polyolefin having incorporated 0.02 to 4 mol% of a compound having polar groups, and further having incorporated a compound having hydrolysable silane groups, and which further comprises 0.0001 to 3 wt% of a silanol condensation catalyst.

2. A low voltage power cable according to claim 1, wherein the polar groups are selected from siloxane, amide, anhydride, carboxylic, carbonyl, hydroxyl, ester and epoxy groups.

3. A low voltage power cable according to claim 2, wherein the compound having polar groups is butyl acrylate.

4. A low voltage power cable according to any of the preceeding claims, wherein the polyolefin comprises 0.1 to 2.0 mol% of the compound having polar groups.

5. A low voltage power cable according to claim 1, wherein the polyolefin comprises 0.001 to 15 wt.% of the compound having silane groups.

6. A low voltage power cable according to claim 1 or 5, wherein the polymer composition further comprises a sulphonic acid or an organic tin compound as a silanol condensation catalyst.

7. A low voltage power cable according to any of the preceeding claims wherein the thickness of the insulation layer is 0.4 to 3 mm.

8. A process for producing a low voltage power cable comprising a conductor and an insulation layer, which layer comprises a polyolefin having incorporated 0.02 to 4 mol% of a compound having polar groups and further having incorporated a compound having hydrolysable silane groups, and which further comprises 0.0001 to 3 wt% of a silanol condensation catalyst, which process comprising extrusion of an

insulation layer on a conductor which is preheated to a maximum temperature of 65 ° C.

9. A process according to claim 8 wherein the extrusion of the insulation layer is performed on the non-preheated conductor.

10. Use of a polyolefin comprising 0.02 to 4 mol% of a compound having polar in the production of an insulation layer for a low voltage power cable.